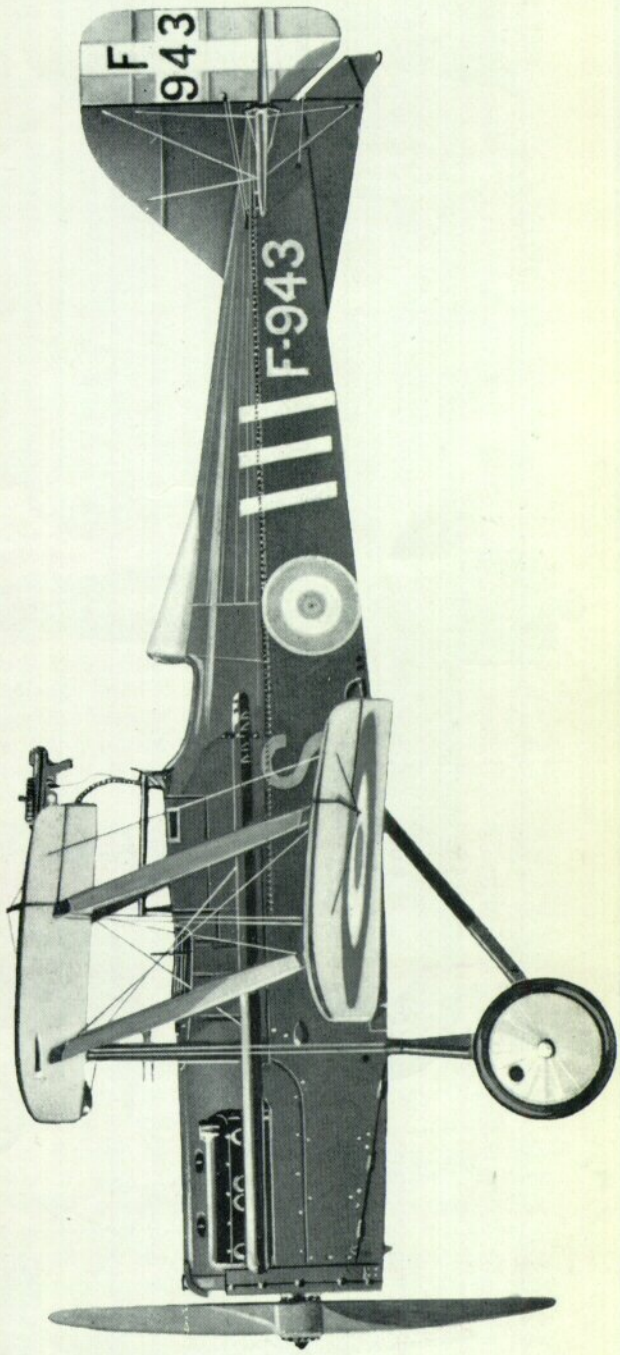
PROFILE PUBLICATIONS

The S.E.5A



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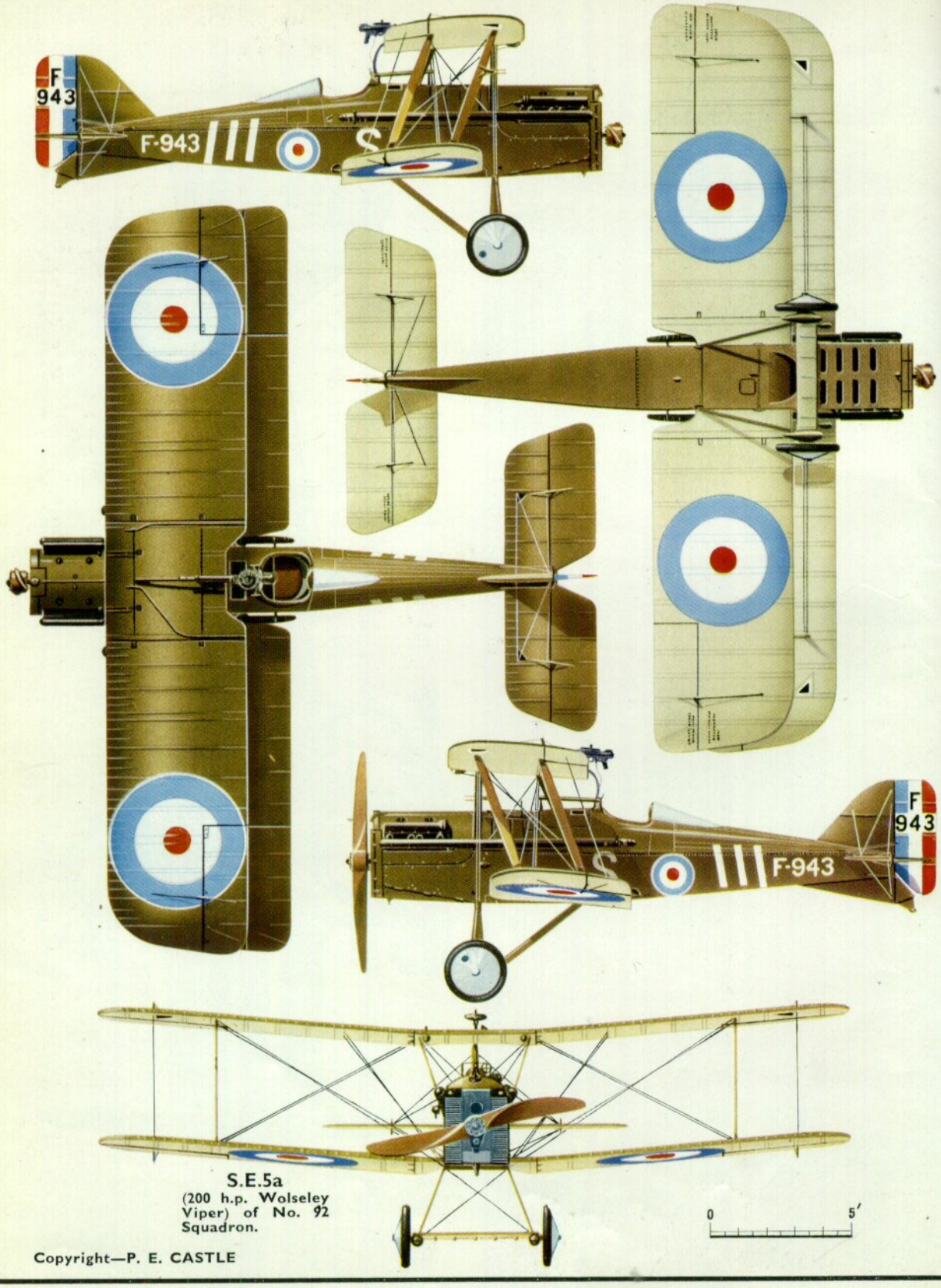

S.E.5a
(200 h.p. Wolseley Viper) of No. 92 Squadron.

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The S.E.5A

by J. M. Bruce

Photographed at Farnborough on November 17th 1917, B4897 had passed its final inspection two days previously. It was one of the first S.E.5a's to have the revised undercarriage with wooden V-struts. Just under the forward end of the exhaust manifold can be seen the number 47. This was a kind of constructor's number applied by the Royal Aircraft Factory, and indicates that this was the 47th aircraft of the batch (B4851-B4900). The engine originally fitted to B4897 was the Peugeot-built Hispano-Suiza No. 115311/W.D.34097, airscrew 19343/T.28137, Vickers gun A.4141, Lewis gun 47202. (Photograph: Crown copyright)

In 1916 the Royal Aircraft Factory designed two single-seat fighters powered by the 150 h.p. Hispano-Suiza engine: the conventional tractor biplane, the work of H. P. Folland, was built as the S.E.5: the less conventional F.E.10 did not proceed beyond the project stage. The S.E.5 went into production at the Royal Aircraft Factory, the later aircraft having wings of slightly reduced span. The development of the S.E.5 will form the subject of a later history in this series.

The initial batch of 24 aircraft (*A4845–A4868*) underwent their final inspections between March 2nd and April 3rd 1917, and deliveries to No. 56 Squadron, then forming at London Colney, began. This famous fighter squadron went to France on April 8th 1917, and had on its strength most of the S.E.5s that were built; a few of the aircraft went to Nos. 40 and 60 Squadrons.

From the start of its career the S.E.5 had been intended to have the 200 h.p. geared Hispano-Suiza engine as soon as supplies could be obtained. The second prototype, *A4562*, had had an engine of this kind (No. 5193/W.D.10104). The Hispano-Suiza originally fitted to *A4563* (No. 7019/W.D.10111) may also have been of 200 h.p.; certainly by the time this, the third, prototype went to Martlesham Heath on May 29th 1917 it had the 200 h.p. Hispano-Suiza No. 7206.

The prototype S.E.5a at Martlesham Heath, May 1917.

By this time *A4563* was regarded as the prototype S.E.5a. It had the wings of reduced span; its engine drove a handsome four-blade left-hand airscrew (to R.A.F. Drawing T.28096); the gravity petrol tank and water header tank were built into the leading edge of the centre section; full-length shutters were fitted on either side of the airscrew hub to the one-piece radiator; and the top decking ahead of the cockpit was deeper than that of the S.E.5. The under-fairing of the nose retained the slight curve that had characterised the S.E.5, and the L-shaped exhausts of the earlier type were fitted.

In Report M.105A Martlesham was laconically satisfied with the S.E.5a's performance: "Flying qualities good; lateral control better than S.E.5. Windscreen is now cut down and view is improved, especially for landing. Control cables and Vickers gun not easily accessible." The speed at 14,000 ft. was 123 m.p.h., that height being reached in 16 mins. 50 secs.; the ceiling was about 23,000 ft. The best recorded comparable performance by an S.E.5 was then 105 m.p.h. at 15,000 ft., with the climb to that height taking 27 mins. 6 secs.

By the standards of May 1917 the figures for the S.E.5a were good. The first production contracts had been placed at the beginning of February with

Martinsyde Ltd. (Contract No. 87/A/1616, dated February 1st 1917, for 200 aircraft, *B.1–B.200*) and Vickers Ltd., Weybridge (Contract No. 87/A/1627 dated February 6th, for 200 aircraft, *B501–B700*). These aircraft were completed as S.E.5a's, as indeed were all those built by contractors.

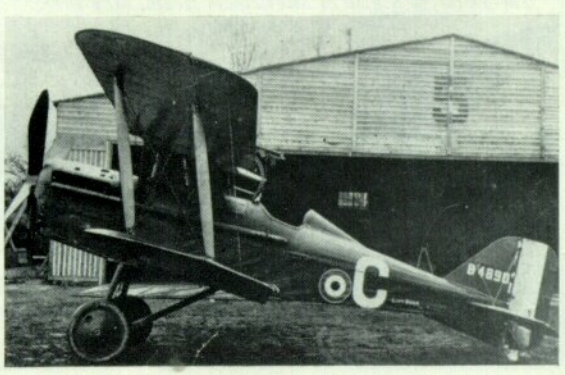
The Royal Aircraft Factory had not waited for Martlesham's confirmation of the S.E.5a's good performance, for at least fifteen aircraft of the second production batch (*A8898–A8947*) built at Farnborough had the 200 h.p. engine. These were *A8923–A8926*, *A8935*, *A8938*, *A8939* and *A8941–A8947*; the engines originally installed in them were made by Wolseley or Peugeot. The first of these S.E.5a's had been completed by May 30th 1917, the day after *A4563* went to Martlesham.

Many of the aircraft of this second R.A.F. batch, including several of the S.E.5a's, went to No. 56 Squadron; the first S.E.5a received by that unit was delivered in June 1917. This may have been the prototype, *A4563*, which is known to have gone to No. 56 Squadron and was later on the strength of No. 84 Squadron. Other early S.E.5a's are known to have been used by No. 60 Squadron, a few by No. 40.

The production S.E.5a's were generally similar to *A4563*. They had long horizontal exhaust pipes, the head fairing behind the cockpit had a straight top line, and the nose underfairing was likewise given a straight-line profile. No 56 Squadron did not at first like the long exhaust pipes, cut them off just behind the rear exhaust stubs, and welded on short pipes at an outward and downward angle. On July 13th 1917, Major R. G. Blomfield, O.C. No. 56 Squadron, reported to the Headquarters of the 9th Wing that the undercarriage was not strong enough for the 200 h.p. engine; failures had occurred at the lower ends of the struts.

As the summer of 1917 advanced, production of the S.E.5a increased steadily. Contracts placed with the Bleriot & Spad Aircraft Works (later renamed the Air Navigation Co. Ltd.) of Addlestone, and Vickers Ltd., in July 1917 were for a total of 850 aircraft; by the end of 1917 a further 1,300 had been ordered, and further large orders continued to be placed throughout 1918. By the end of 1917 over 800 S.E.5s and 5a's had been built, yet only five squadrons (Nos. 40, 41, 56, 60 and 84) were operating the type in France; of these, Nos. 40 and 41 had completed their re-equipment as late as November, Additionally, No. 24 Squadron received its first S.E.5a on Christmas Day 1917, and No. 68 Squadron was re-equipped with the type in that December.

The reason for this lay in the difficulties that had been experienced with the 200 h.p. Hispano-Suiza engine. Having one of the best power/weight ratios of the time, this engine was built in enormous numbers



B4890 was captured intact by the Germans. This aircraft had passed its final inspection at Farnborough on October 13th 1917, at which time it had the Wolseley-built Hispano-Suiza engine No. 943/2233/W.D.8518 driving airscrew No. 21271/T.28096 and was armed with Vickers gun No. 7624 and Lewis No. 48298. It had the original steel-tube undercarriage V-struts, and an additional bracing wire was fitted to the leading edge of the fin. The aircraft may have belonged to No. 56 Squadron, and was shot down by Jagdstaffel 5. (Photos: Egon Krueger)

B4885 force-landed in Holland on January 6th 1918 and was later used by the Dutch air service, in whose markings it is seen in this photograph; its Dutch number was SE124. Originally this S.E.5a had a special installation of twin Lewis guns when it was inspected on 25th September 1917, but at the time of its forced landing it had the standard single Lewis on its Foster mounting.

It had served with No. 60 Squadron, R.F.C. Like B4890 it had the steel-tube undercarriage, but its engine drove a two-blade airscrew. An S.E.5a (above) of No. 24 Squadron with reduced dihedral. The headrest has been removed and the windscreen modified. Although the engine is a Viper, the aircraft retains the higher Foster mounting that was standard on S.E.5a's with geared engines.

Apparently an early installation of a Wolseley Viper engine. The top of the radiator is not of the shape that became standard, and the under-fairing is shallower than on production Viper-powered aircraft.

The small number 98 stencilled on the side of the forward fuselage indicates that this S.E.5a is C1148. This aircraft passed its final inspection on September 28th 1918, when it had engine No. 2297/W.D.33397. In February 1919 it was fitted with a Royal Aircraft Establishment variable-pitch airscrew. This photograph is dated June 11th 1920, and shows the aircraft with standard Viper installation and fixed-pitch airscrew; it has short exhaust pipes and the wooden undercarriage.

C1091, photographed on April 26th 1920, with an experimental variable-pitch airscrew. (Photo: Crown copyright)

(in all, 28,977) were made during the war) by many manufacturers in France, Spain, England, Italy, Russia, Japan and the U.S.A. Wolseley Motors Ltd. of Birmingham held the British licence to manufacture Hispano-Suiza engines and had begun to deliver small numbers of the 150 h.p. version early in 1917.

With admirable foresight, the Admiralty had insisted in November 1916 that the Air Board order 8,000 Hispano-Suiza engines from French manufacturers, chiefly Emile Mayen. Deliveries of Mayen-built engines did not start until early 1918, consequently engines from other manufacturers had to go into the S.E.5a's.

The Wolseley-built 200 h.p. Hispano-Suiza, later known as the Wolseley Adder, was virtually identical with the original 200 h.p. engine. It differed chiefly in

The S.E.5a with Viper engine and underslung radiator. (Photo: I.W.M.)

having a compression ratio of 4·8 : 1 (4·7 : 1 on the French engine) and a reduction-gear ratio of 35 : 59 (24 : 41 or 21 : 28 on French engines). On test the Wolseley-made engine proved unsatisfactory: on 7th May 1917 it was reported that four successive crankshafts had failed after an average run of only four hours. Yet on 30th May the S.E.5a *A8923* was completed with the 200 h.p. Wolseley No. 782/2233/W.D.8357, and seven other aircraft of the batch also had Wolseley geared engines.

On May 31st 1917 Lt.-Col. W. B. Caddell, then Military Aviation Director, wrote to Major-General Trenchard that the S.E.5a's *A8923* and *A8924* were fitted with 200 h.p. Wolseley Hispano-Suizas in which the crankshaft webs had been shaved down, and that these engines had been accepted on the understanding that they would not be run at speeds in excess of 1,750 r.p.m. Normal r.p.m. for the 200 h.p. engine was 2,000.

Of the engines fitted to the other 200 h.p. S.E.s of this second R.A.F.-built batch five were Peugeot-made, one was Aries-built, and one was made by Hispano-Suiza, Paris. Fifty more S.E.5a's (*B4851–*

The R.A.E. hack S.E.5a, D203, with modified fin and rudder, narrow-chord ailerons, nil dihedral, and Viper radiators on a geared Hispano-Suiza engine, which has the final, short exhaust pipes. This photograph is dated August 29th 1918. (Photo: Crown copyright)

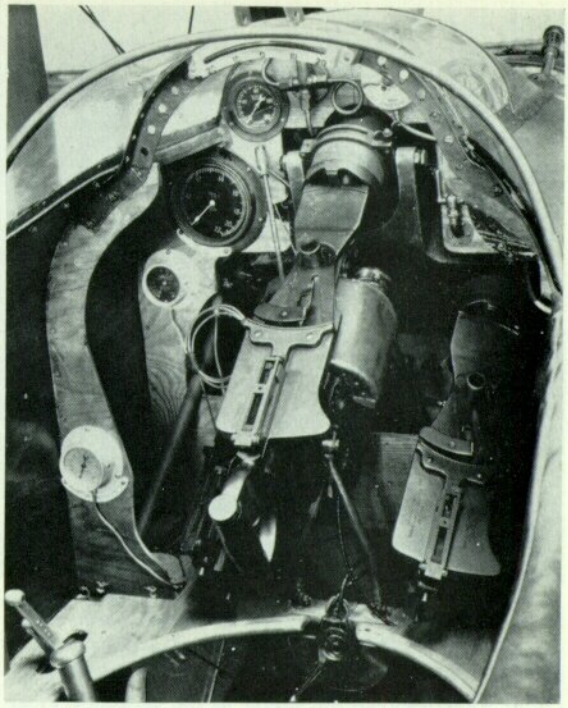
For training purposes several S.E.5a's were modified to become two-seaters, to the considerable detriment of the aircraft's flying qualities. (Photo: I.W.M.)

B4900) were built at the Royal Aircraft Factory between July 26th and November 13th 1917; thirty-six had Wolseley-made Hispano-Suiza engines.

The general engine-supply situation had become so critical by the autumn of 1917 that Hispano-Suizas made by the French Brasier firm were passed into service with imperfect reduction gears "on the plea that engines of incomplete efficiency were better than none at all" (*The War in the Air*, Vol. VI, page 36).

In January 1918 about 400 new S.E.5a airframes were in store, engineless, owing to the failure of the engine programme. Only the delivery, starting about that time, of the 8,000 engines ordered at the insistence of the Admiralty enabled squadrons to be re-equipped and new units to go to France.

Misinterpreting an instruction to make 400 Hispano-Suizas of the 150 h.p. model (this was



The cockpit of B4875. The three Lewis guns were 43381 (port), 43435 (centre) and 47804 (starboard), and their presence in the cockpit necessitated the redistribution of the aircraft instruments. Obviously replacing the drums of ammunition on three guns would have been difficult, and the pilot could not have escaped serious facial injury in the event of a crash.

(Photo: Crown copyright)

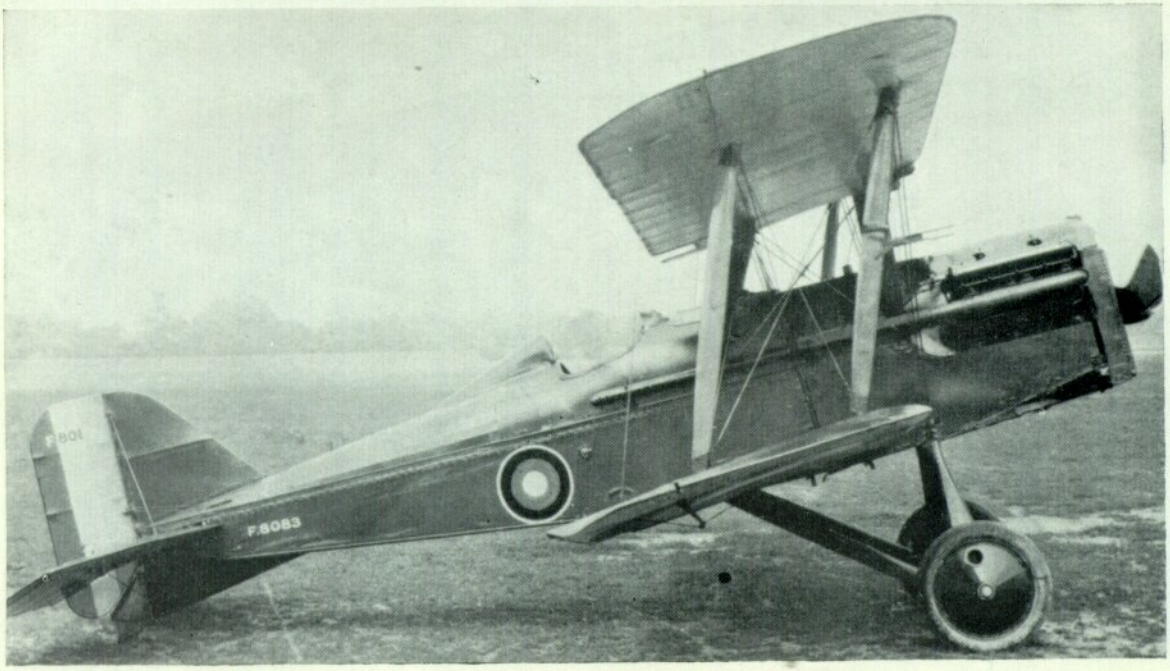
Fairly extensive modifications had to be made to B4875 in October 1917, when it was fitted with the Eeman triple mounting for three Lewis guns. The fuselage decking ahead of the cockpit was deepened, an extended windscreen was fitted, a modified centre section with three slots permitted the guns to fire upwards at an angle of 45°, and the gravity petrol tank and water header tank were installed in the leading-edge portion of the starboard upper wing. Transparent panels were let into the fuselage sides. This aircraft was originally completed in September 1917 with the Wolseley engine No. 930/2233/W.D.8505, but that engine was soon transferred to B4884 and by the time B4875 had the Eeman mounting installed its engine was No. 120007/W.D.34176 of Delaunay Belleville manufacture.

An S.E.5a in American service and markings, seen at Quantico in June 1921. The under-fairing of the nose has been removed and the structure under the fuselage may have been a bomb rack. (U.S. Navy photo)

intended as a safety measure following the failure of the first Wolseley-built 200 h.p. engine) the Wolseley company redesigned the engine as the Wolseley Viper, a direct-drive unit with a compression ratio of 5·3 : 1 in its standard form. In August 1917 the first installation of a Viper in an S.E.5a was made in *B4862* at Farnborough (engine No. 717/2233/W.D.8292), the second in *B4899* (engine No. A21777/W.D.1877) in December. The first aircraft was tested at Martlesham in September 1917, *B4899* in December. Neither achieved outstanding results, but the Viper engine was favourably reported on.

The early experimental Viper installations retained the one-piece radiator with round-top cowling, but the production version had two radiator blocks, one for each bank of cylinders. The standard Viper installation of the late production S.E.5a was characterised by a deep nose with a squarish frontal aspect. Although the Viper was in 1918 specified in all but the Martinsyde contracts, S.E.5a's continued to be delivered with such engines as the manufacturers could obtain. The majority of these aircraft had two-blade airscrews, standard designs being A.B.8080 or T.28137M on Wolseley-built 200 h.p. geared engines or French Hispanos with 21 : 28 gears, A.B.7673 or A.D.662 on the Viper. The four-

Another American S.E.5a was F8083, here seen wearing American roundels.



blade airscrew (T.28096) usually distinguished those S.E.5a's that had French engines with 24 : 41 gears.

In the spring of 1918 an experimental Viper installation with underslung radiator was tested. This is believed to have been an attempt to make the aircraft more suitable for operations in Mesopotamia, where the type was in use with one Flight of No. 72 Squadron.

In January 1917 the Sunbeam Arab engine, although only partly tested, was ordered into large-scale production. It was a water-cooled 200 h.p. V-eight of about the same size and of the same configuration as the Hispano-Suiza; it was therefore natural that the Arab should be considered as a possible alternative engine for the S.E.5a when the Hispano-Suiza crisis arose. In November 1917 the R.A.F.-built S.E.5a B4900 was completed with an Arab I in place of the standard Hispano-Suiza. In 1918, *B609*, *C1111*, *B4898*, *D7017* (which had been renumbered from *B7832* and was actually an Aeroplane Repair Depot rebuild) and *E1366* were also fitted with Arab engines, *C1111* having both the Arab I (geared) and Arab II (direct-drive). Endless troubles, especially with vibration, were experienced, and the engine was not adopted for the S.E.5a.

Apart from the continuous quest for suitable engines, much experimental work was done on S.E.5a's at Farnborough. The following table lists examples.

Aircraft	*Date*	*Modification or Experiment*
A8938	June 1917	Balanced rudder somewhat similar to that of the R.T.1 two-seater. Flown in September 1917 with ailerons of 10-inch chord and narrow-chord elevators. Crashed December 1917 by Capt. (later Professor) G. T. R. Hill.
A8947	August 1917	Narrow-chord elevators.
	March 1918	Converted to S.E.5b.
B4893	November 1917	Wings of 6 ft. chord.
C1063	February 1918	Reduced dihedral of 2° 30′.
	September 1919	Gravity ground indicator.
D203	March-August 1918	Rounded fin and balanced rudder, narrow-chord ailerons, nil dihedral. Viper-type radiators on 200 h.p. Hispano-Suiza.
	October 1918	Balanced central rudder and twin fins.
	—	Twin fins and rudders (drawing of this tail unit is dated October 1919).
	January 1919	Spinning tests.
	—	*D203* remained in use at Farnborough at least until May 1922. It was used in tests of various experimental exhaust systems.
C1134 (renumbered from *C1139*)	September 1918	Hart variable-pitch airscrew. (The S.E.5a's *C1134* and *C1139* interchanged identities at this time.)
E5696, *F5278*	December 1918	Parachute experiments.
D7007	December 1918	Palethorpe landing skid.
D7012	February 1919	Palethorpe landing skid.
C1148	February 1919	Variable-pitch airscrew.
C1091	April 1920	Variable-pitch airscrew.
E5927	October 1920	Major G. H. Norman's experiments with fire-extinguishing equipment.
	October 1925	Exhaust-muff cockpit heater.
	February 1926	Thermostat radiator shutter control.
E5923	1920	Fitted at Martlesham with an experimental tail unit, embodying a fin and rudder of rounded outline, a triangular tailplane of which the rear part was adjustable, and inversely tapered elevators. This aircraft was flown at Farnborough in comparative trials with S.E.5a *D7018* and the S.E.5b, *A8947*.

Few attempts were made to change the armament of the S.E.5a, despite the seemingly peculiar arrangement of one Vickers gun offset to port, the Lewis central above the centre section, and both guns mounted at an upward angle of 5°. Of the Lewis gun, Lord Douglas of Kirtleside (who, as Major W. Sholto Douglas, M.C., was O.C. No. 84 Squadron, R.F.C., in late 1917) wrote:

G-EBVB was one of the skywriting S.E.5a's. Their extended exhaust pipes met in a single outlet, to clear which a cut-out was made in the rudder.

> Although I was all for new methods of attack, I found that pushing the Lewis gun back into the fixed position while flying in the open cockpit of the S.E.5 (*sic*) at high altitude called for an effort that was almost superhuman. We had no supply of oxygen in those days, and I found that my strength at height fell off very considerably. It was difficult enough to change the double drum of ammunition on the Lewis gun without having to man-handle the gun into position for an attack and fly the aeroplane all at the same time. There were others who had the same experience, and more often than not we had to dive down to a lower altitude before we could reload. (*Years of Combat*, page 218.)

This difficulty had probably not manifested itself as early as July 1917, when No. 56 Squadron submitted a design for a modified Foster mounting capable of carrying two Lewis guns; the Royal Aircraft Factory was instructed to fit this to an S.E.5a. This is doubtless why, in September 1917, *B4885* was fitted with two Lewis guns (Nos. 28743 and 47202) in addition to the usual Vickers (No. A5182). In November 1917, *B4875* was extensively modified to accommodate the Eeman mounting with three Lewis guns firing upwards at an angle of 45°. Three slots were cut in the centre section, the gravity petrol tank and water header tank being necessarily moved to the leading-edge portion of the starboard upper wing. The Eeman installation was apparently intended for Home Defence anti-airship duties, but, although tried out in a Martinsyde G.102 and a Vickers F.B.26, it was ultimately abandoned.

The S.E.5a was tried on Home Defence Duties in 1918 with squadrons Nos. 37, 50, 61 and 143, but was withdrawn largely because it proved to be difficult to land at night on the small aerodromes of the period. A secondary reason was that its water-cooled engine took too long to warm up, consequently it was unable to take off as quickly as the rotary-powered Camel.

B4875 must have been one of the first S.E.5a's to have the wooden undercarriage, which was apparently Farnborough's answer to Major Blomfield's complaint that the original steel-tube structure was not strong enough. The front leg consisted of two struts faired together with plywood.

In 1918 various minor modifications and improve-

The Canadians also made a two-seat conversion of the S.E.5a. G-CYCE was originally F9117. It appears that a modified centre section, possibly containing a gravity tank between the spars, was fitted. (Photo: K. M. Molson)

ments were made: the wing trailing edges were strengthened in February; a new type of oil tank with double pump was introduced in May, at which time the Lewis-gun mounting rail on Viper-powered S.E.s was lowered (but some aircraft, possibly re-engined with a Viper after having had a geared Hispano-Suiza, retained the higher mounting). In July the nose cowling for the 200 h.p. Hispano-Suiza was re-designed to facilitate manufacture. The Martinsyde company redesigned the structure of the upper fin; in September Wolseley evolved a new type of wooden undercarriage.

In the squadrons various modifications were made, often to the taste of individual pilots. Many preferred to remove the headrest; some liked to cut the cockpit lower at the sides; No. 24 Squadron reduced the dihedral of their aircraft for a time. Of more general application was the addition of stay-wires to the leading edge of the fin.

During 1918 the S.E.5a consolidated the fine reputation it had established, in spite of engine troubles, in 1917, and proved to be one of the best fighting aircraft of the war. It was stable yet light on the controls, steady in a dive and a good gun platform, structurally strong and fast enough to be able to extricate itself from trouble if need be. Many of the greatest fighting pilots—Mannock, Bishop, McCudden, Beauchamp-Proctor, McElroy, Maxwell —flew the S.E. with great distinction. Of the S.E., McCudden wrote:

> The S.E.5 (*sic*) which I was now flying was a most efficient fighting machine, far and away superior to the enemy machines of that period . . . Other good points of the S.E.5 were its great strength, its diving and zooming powers, and its splendid view. Apart from this, it was a most warm, comfortable and easy machine to fly . . . prisoners said that the German pilots considered the S.E.5 a most formidable fighting machine. (*Five years in the Royal Flying Corps.*)

At the time of the Armistice some 2,700 S.E.s were on the strength of the Royal Air Force, and the type was in service with twenty British, one Australian and two American operational squadrons.

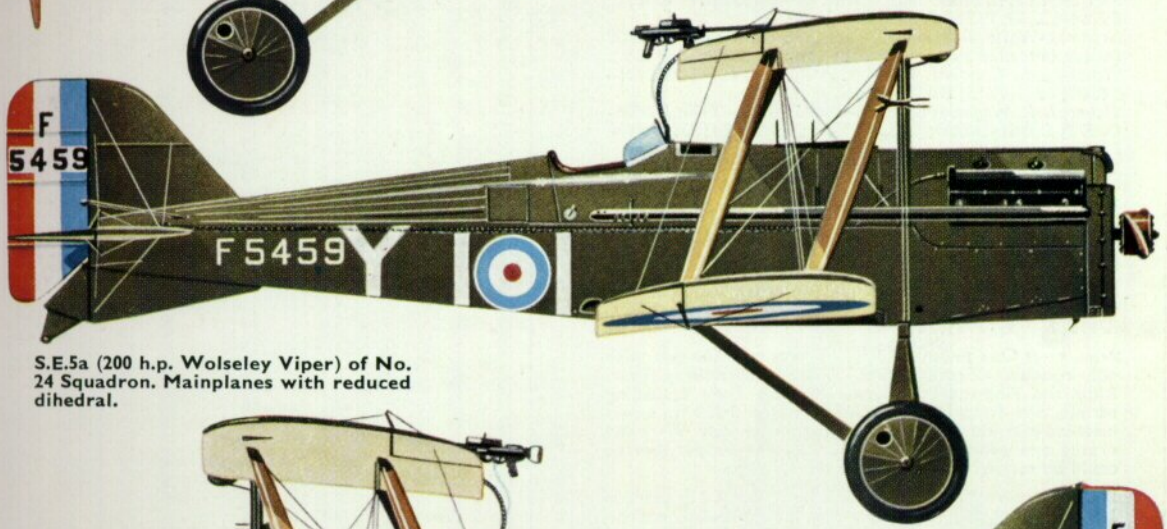
Large-scale production in America was planned. Components of fifty-six S.E.5a's (including *C1115*, *C1119–C1121*, *C8740*, *C8746*, *C8749*, *C8750*, *C8752–C8754*, *C9081*, *C9087–C9089*, *D6101*, *D6102*, *D6105*, *D6109–D6112*) were sent to the U.S.A., where they were assembled by the Curtiss company. Curtiss had a contract for 1,000 S.E.5a's to be powered by the 180 h.p. Wright-Martin Hispano-Suiza, but only one, S.C.43153, was completed. Its official tests began on August 20th 1918, but no more were built and the remaining 999 were cancelled at the Armistice. In October 1918 the American Expeditionary Force bought thirty-eight S.E.5a's.

When peace came the S.E.5a continued in service in the air forces of Australia, Canada and South Africa. Some remained in use in the U.S.A., but they were largely supplanted by the Eberhardt conversion, the S.E.5E. Two S.E.5a's went to the U.S. Navy, however, with the designating numbers *A-5588* and *A-5589*; one was carried on a gun-turret launching platform on the battleship *Mississippi*. A few went to Poland and were used against Russia in 1920; at least one was captured and flown with the red-star insignia.

Nowhere was the type numerous, however. In Britain a few remained in service at the R.A.E. for several years, and fifty acquired civil identities. Some of the R.A.E. aircraft had a modified undercarriage with steel-tube V-struts and a separate axle for each wheel.

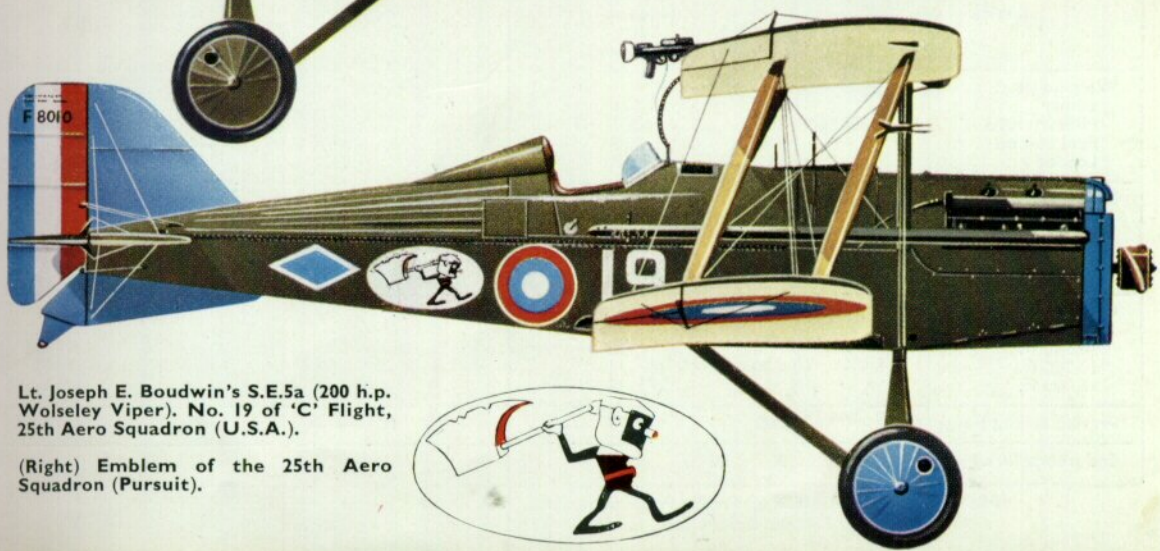
The civil S.E.5a is perhaps best remembered as the pioneer skywriting aircraft, and it is one of these that was rebuilt in 1959 and is flying today. Originally F904, subsequently *G-EBIA* and now *D7000*, it is the only surviving airworthy example of this great fighting aeroplane. In the Australian War Museum at Canberra *A2-4* is preserved; it has an oleo undercarriage. The true identity of the S.E.5a in the Science Museum, South Kensington, is *F938* (ex *G-EBIB*); and *F937*

McCudden's S.E.5a (200 h.p. geared Hispano-Suiza with four-bladed propellor) of No. 56 Squadron.



S.E.5a (200 h.p. Wolseley Viper) of No. 24 Squadron. Mainplanes with reduced dihedral.

S.E.5a (200 h.p. Wolseley Viper) of No. 85 Squadron.



Lt. Joseph E. Boudwin's S.E.5a (200 h.p. Wolseley Viper). No. 19 of 'C' Flight, 25th Aero Squadron (U.S.A.).

(Right) Emblem of the 25th Aero Squadron (Pursuit).

(ex *G-EBIC*) survives as one of the Nash collection.

Only one development of the S.E.5a was flown. This was the S.E.5b which had sesquiplane wings and a cleaned-up engine installation with underslung radiator. It appeared at the beginning of April 1918 and was flown experimentally at Farnborough for a few years. It was later fitted with standard S.E.5a wings of equal span.

Production: The following serial numbers for 5,489 S.E.5a's are known; they exclude the A.R.D. rebuilds. Two hundred known to be cancelled; not all of the others were delivered.

Royal Aircraft Factory, Farnborough, Hants. A8923–A8926, A8935, A8938, A8939, A8941–A8947; B4851–B4900; C1051–C1149; D7001–D7050 (only first 20 built; at least one, *D7017*, was merely an A.R.D. rebuild, *B7832*, renumbered).
Austin Motor Co. (1914) Ltd., Northfield, Birmingham. B8231–B8580; C8661–C9310; E5637–E5936; F7951–F8200.
Air Navigation Co. Ltd., Addlestone, Surrey. C1751–C1950; E5937–E6036; H674–H733.
Martinsyde Ltd., Brooklands, Surrey. B1–B200; D3911–D4010; E3154–E3253; F5249–F5348; F8321–F8420.
Grahame-White Aviation Co. Ltd., Hendon. C6351–C6500 (order cancelled and transferred to Wolseley Motor Co.).
Vickers Ltd., Crayford. C5301–C5450; D301–D450; D8431–D8580; F551–F615; F8946–F9145.
Vickers Ltd., Weybridge. C9486–C9635; D201–D300; D3426–D3575; D5951–D6200; E1251–E1400; E3904–E4103; F5449–F5698.
Whitehead Aircraft Co., Richmond. B1001–B1100 (order cancelled).
Wolseley Motors Ltd., Birmingham. C6351–C6500; D6851–D7000; F851–F950; F7751–F7800.
H5291–H5390 allotted for S.E.5a; contractor unknown, contract cancelled.

Known A.R.D. rebuilds. B733, B848, B891, B7824, B7830, B7832 (later renumbered *D7017*), *B7870, B7881, B7901, B7913, F5912, F5924, F6276, H7162, H7165, H7261.*

Armament: One fixed 0·303 in. Vickers machine-gun with 400 rounds. Constantinesco C.C. synchronising gear, Aldis and ring-and-bead sights, Hyland Type E loading handle, and Fitzgerald jam clearers. One 0·303 in. Lewis machine-gun on Foster mounting with four 97-round drums and Norman sight. Four 25 lb. Cooper bombs could be carried in racks under the fuselage.

Service use: Western Front—R.F.C. (later R.A.F.) Squadrons Nos. 1, 24, 29, 32, 40 ,41, 56, 60, 64, 68 (No. 2 Squadron Australian Flying Corps), 74, 84, 85, 92, 94; 25th and 148th Aero Squadrons, United States Air Service. *Palestine*—R.F.C./R.A.F. Squadrons Nos. 111 and 145. *Mesopotamia*—No. 72 Squadron. *Macedonia*—Squadrons Nos. 17, 47 and 150. *Home Defence*—R.A.F. Squadrons Nos. 37, 50, 61 and 143.

Examples of S.E.5a's used by operational squadrons:
No. 1 Sqn.—*B130, B8254* (aircraft '*O*'), *C8700* ('*P*'), *C8846* ('*M*'), *D6878, E5969* ('*A*').
No. 24 Sqn.—*B548* ('Z'), *B8422, C1098* (Capt. G. E. H. McElroy), *C1938, D6918, E1293, F5459* ('Y').
No. 29 Sqn.—*B8507, C8904* ('*A*'), *D5963, E5669* ('Y'), *F862, H7162.*
No 32 Sqn.—*B166* ('*A*'), *B8374, C1089, D262, E1399, E4026.*
No. 40 Sqn.—*B69* ('*U*'), *B4879* (Major R. S. Dallas), *C1071* ('Y'), *D6197, D7000, E1318.*
No. 41 Sqn.—*B642, C5436, C8877* (Lt. W. G. Claxton), *D5959* (Capt. F. R. McCall), *E1362, E.5665.*
No. 56 Sqn.—*A8923, B183* ('4'), *C1096, D6096, E5656, F5556, H693.*
No. 60 Sqn.—*B567, C1937, D6136* ('Z'), *E4095* ('*V*'), *F5471, H690.*
No. 64 Sqn.—*B2, B125, C6418, C6447, D289, D6900.*
No. 68 Sqn.—*B535, C1057* ('*C*'), *D6995, E5951* ('Z'), *F5465, H7165.*
No. 74 Sqn.—*B574, C1139* (Capt. K. L. Caldwell), *C9211* ('*D*'), *D276* ('*A*', Capt. E. Mannock), *D6922, E5967.*
No. 84 Sqn.—*B682, B8233, C1794* (Lt. A. W. Beauchamp-Proctor), *D6926, F5477, H710* ('*P*').
No. 85 Sqn.—*B7870, C6490* (Major W. A. Bishop, V.C.), *C6492, D6871, E1294* and *E1295* flown by 2nd Lt. D. C. Inglis and Major E. Mannock on July 26th 1918, when Mannock was killed.
No. 92 Sqn.—*B8430, C1142, C8896, D6925, E4024, F858.*
25th Aero Sqn., U.S.A.S.—*F8005, F8010, F8015, F8028, F8038, F8040.*

SPECIFICATION

Power: 200 h.p. Hispano-Suiza 8Bb, 8Bd, 8Cb, 8Cd, 8Db, 8Dd, 8Eb, 8Ed; 220 h.p. Hispano-Suiza 8Bc, 8Be, 8Cc, 8Ce, 8Dc, 8De, 8Ec, 8Ee; 200 h.p. Wolseley W.4a Viper; 200 h.p. Wolseley W4b Adder I, II and III; 200 h.p. Sunbeam Arab I and II.
Dimensions: Span 26 ft. 7·4 in.; length 20 ft. 11 in.; height 9 ft. 6 in.; chord 5 ft.; gap 4 ft. 7 in.; stagger 1 ft. 6 in.; dihedral 5°; incidence 5°; span of tail 10 ft. 11·9 in.; airscrew diameter (T.28096, four blades) 7 ft. 9 in., (A.D.662, two blades) 7 ft. 10½ in.; wheel track 5 ft. (tyres, Palmer 700 × 100 mm.).
Areas: Wings and ailerons 245·8 sq. ft.; ailerons, each 8 sq. ft.; tailplane 14·7 sq. ft.; elevators 15·8 sq. ft.; fins, upper 4·4 sq. ft., lower 1·7 sq. ft., total 6·1 sq. ft.; rudder 5·85 sq., ft.

WEIGHTS AND PERFORMANCE

Aircraft	*A4563*	*B7*	*B501*	*B4862*	Production Aircraft	American-built S.C.43153
Engine	200 h.p. Hispano-Suiza	200 h.p. Hispano-Suiza (Wolseley)	200 h.p. Hispano-Suiza (Wolseley)	200 h.p. Wolseley Viper	200 h.p. Wolseley Viper	180 h.p. Wright-Martin Type E
Weights (lb.):						
Empty	1,400	1,531	—	1,406	—	—
Military load	287	287	—	286	—	—
Fuel and oil	266	230	—	248	—	—
Loaded	1,953	2,048	—	1,940	1,988	2,060
Max. speed (m.p.h.):						
At ground level	—	—	—	—	—	122·3
At 6,500 ft.	—	—	132	—	—	—
At 10,000 ft.	—	126	128	130	—	117
At 15,000 ft.	121	116·5	115·5	122·5	120	—
Climb to:	m. s.	m. s.	m. s.	m. s.	m. s.	m. s.
5,000 ft.	— —	— —	— —	— —	— —	— —
6,500 ft.	6 0	7 30	— —	— —	6 20	— —
10,000 ft.	10 20	13 15	13 46	10 50	10 50	13 0
15,000 ft.	18 50	27 35	26 30	20 50	20 50	— —
Service ceiling (feet)	22,000	17,000	—	—	19,500	—
Endurance (hrs.)	3	2¼	—	—	3	—

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